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JOINT MEETING

SECTIONS OF BIOLOGY AND PSYCHOLOGY[1]

JANUARY 17, 1944

PROFESSOR EDWIN G. CONKLIN, American Philosophical Society, Philadelphia, Pa.: *Ends as Well as Means in Life and Evolution.*

INTRODUCTION

I am proud to be an honorary member of The New York Academy of Sciences, but I have not heretofore been able to attend any of its meetings, although I read with interest and profit its publications. Once before I was prevented by sickness from attending an Annual Meeting, at which I was scheduled to speak. Therefore, when the Chairman of the Section on Psychology invited me to speak on this occasion, I felt that I could not refuse, although I am no psychologist. I am by courtesy a biologist, but my field of research is embryology and cytology. However, these subjects have broad bearings on all biology and psychology and they even afford a "take off" into realms of philosophy. I hope this *apologia* may explain my presence at this meeting, my choice of subject, and my limitations in dealing with it.

I fear that this topic, "Ends as Well as Means in Life and Evolution," is out of date, if not out of place, in a time and center so noted

[1] No meeting was held in January by the Section of Geology and Mineralogy.

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for its work in experimental biology and psychology, for I appear as the voice of one crying in the wilderness of analytic and mechanistic science, not to proclaim a New Dispensation, as did John the Baptist, but to recall biologists to some of the problems of the older naturalists. The extreme specialization of science has tended to obscure the larger aspects of Nature, as a whole. It has been said that modern science consists in knowing more and more of less and less. Certainly it is concerned largely with analysis and always more analysis. Living things are analyzed into organs, tissues, cells, chromosomes, genes, and their functions into tropisms, reflexes and forced movements, while the synthesis of all of these elements into the broader aspects of the organism and its relation to environment are too much neglected. Of course, analysis is necessary, but so also is synthesis if we are to see organisms as living beings. We lose sight of these larger aspects of life in the process of analysis, unless we reverse this procedure from time to time and consider organisms and environment synthetically.

Life has been compared to a beautiful tapestry, woven in intricate design of many threads and colors. By means of physics, chemistry, physiology, anatomy, embryology and genetics we unravel this texture, separate its constitutent threads and colors, but lose the pattern as a whole. These analytical sciences have enormously increased our knowledge of life's constituent elements and processes, but the pattern of the tapestry is usually neglected or ignored.

We are often assured by analytical scientists that genuine science concerns itself only with means and mechanisms. It asks only the questions What, How, When, but never Why. But the human mind insists on asking Why, for this is the most important of all questions in dealing with human experiences and relations and it is the most intriguing and baffling of all questions regarding nature. Aristotle, the greatest naturalist of antiquity, recognized four classes of inquiries regarding the causes of phenomena: (1) material causes, (2) efficient causes, (3) formal causes, and (4) final causes. Francis Bacon said that the first and second of these belonged to physics, the third and fourth to metaphysics. Concerning final causes, he said that they were like the Vestal Virgins, sacred but barren. Huxley compared final causes to the Hetaerae with whom philosophers amuse themselves. But no philosopher, scientist, or average human being can avoid asking the question Why, or fail to feel that the end, goal, meaning or purpose of any phenomenon in nature is the most significant inquiry that can be made

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about it. Aristotle, "the master of those who know," was great in every field of knowledge, but greatest of all in zoology. In his "De Partibus Animalium" he maintained that the essence of a living animal is found not in *what* it is, or *how* it acts, but *why* it is as it is and acts as it does. This question *why* is a hard one to answer, perhaps impossible to answer fully or satisfactorily, but it is one that cannot be wholly disregarded, and, by facing it frankly, we may be saved from much shallow thinking, cocksureness and narrowmindedness. Let us take a long, a broad view of the living world, see something of the pattern of the tapestry of life which has been woven throughout the ages and face, frankly, the questions *what, how* and *why,* problems not only of ways and means but also of ends and meanings.

Ends and Values in Living Phenomena

Herbert Spencer said that life consists in continual adjustment of internal conditions to external ones. This adjustment of living things to their environment is more than physical and chemical equilibrium; it is more like the conscious adjustments that human beings make to hunger, thirst, cold, etc., and the unconscious adjustments that animals make to pleasant or unpleasant conditions. Upon such adjustments the continuance of life depends; when it fails, life ceases.

So far as the astronomer or physicist or chemist knows, it makes no difference to a star, or atom, or molecule, whether it continues to exist as such or not; but the biologist sees abundant evidence that it makes a great difference to a living thing whether it continues to live or not. Innumerable structures and functions, adjustments and regulations are found in living things to enable them to continue to live. The trend, or drive, or struggle for existence is one of the most universal of all living phenomena. Continuity of life is the great *end* of living; survival its greatest *good*; extinction its greatest *evil.* The moment we pass from the lifeless to the living world, we enter a world of ends and values. And, until physics and chemistry can deal effectively with these phenomena of life, biology must remain an autonomous science.

But, while adjustment or adaptability are characteristic of all life, special adaptations or fitness to special conditions are usual but not universal, and they are relatively but not absolutely perfect. Such adaptations are seen in many structures, functions and relations, but not in all. Sooner or later these adaptations always fail and death results. The occasional lack of adaptations to meet specific conditions

and the general difficulty of explaining them mechanistically have led some extreme mechanists to deny the existence of adaptations and thus to explain them by explaining them away. At the meeting of the American Society of Naturalists in 1912, I presided over a symposium on adaptation, in which one of the speakers denied that there were any such things as adaptations. Another speaker expressed his amazement at such an assertion; he said that he had always supposed that fishes were fitted to live in water, birds to fly, moles to burrow, that eyes were for the purpose (or end) of seeing, ears for hearing, muscles for motion, and so on through hundreds and thousands of fitnesses for particular functions or conditions.

Let me begin by pointing out the fact that purposive phenomena are usually wholly distinct from conscious purpose. Indeed, even in man, consciousness occupies a relatively small place in our lives. The larger part of our total existence, from conception to death, is passed in a condition of unconsciousness; and yet the structures and functions of the germ cells from which we came, their maturation and fertilization, the cell and nuclear divisions which give rise to tissues, organs and systems, the complicated chemical and physical phenomena involved in digestion and assimilation, in respiration and excretion, in irritability, sensitivity and regulation, all are purposive in that they are directed to certain ends, and yet they are wholly unconscious. Evidently usefulness, fitness and purposiveness are not necessarily nor usually accompanied by conscious purpose. With this brief introduction to a vast theme and this explanation of some of the terms and phrases which must be used, we will consider, all too briefly, some of the multitude of ends and fitnesses of animals and plants.

1. Let me briefly classify some of the outstanding fitnesses of living things, and pardon a zoologist for mentioning, chiefly, the fitness of animals rather than those of plants. And let us consider in the first place racial or inherited adaptations which have arisen in the course of evolution,—according to generally accepted opinion. Here are found most of the striking fitnesses of organisms, such as the adaptation of animals and plants for particular media or habitats, such as the fitness of fish and seals and whales for life in water; the fitness of birds for flying, where lightness and strength of feathers, wings, muscles and bones have not been excelled by any materials in airplane construction; the remarkable adaptations of animals and plants to extreme changes in temperature, humidity, atmospheric or submarine pressures. There seems to be

almost no place on earth into which some organisms have not penetrated and become at home.

2. Another class of environmental adaptations are found in the means of offense or defense against other living enemies, such as strength or speed, armor, horns, tusks, stings, fangs, stink gas, colors, camouflage. Almost every means of offense or defense known to man is found in different animal species.

3. Still another class of interorganismal adaptations is found in the interrelations of flowers and insects, which Pastor Konrad Sprengel first explored in 1793 in his "Neue entdeckte Geheimnis der Natur." Also in the adaptive relationship between parasites and their hosts, where the ingenuity of omniscient fiends could scarcely exceed the infernal ingenuity of the malarial parasite, for example, in undergoing change of form, host and particular location, by which it is enabled to gain admission to the blood of man or other animals. Finally, in this class of interorganismal adaptations, consider all the marvellous adaptations of sex, ranging all the way from the peculiar structures and functions of spermatozoa and ova to the behavior and psychology of males and females in courtship, mating and care of young. Nothing in all nature exceeds in complexity and nicety of fitness such adaptations of sex.

All of these classes of adaptations, with thousands of other examples, are racial or inherited fitnesses; and the problem of their origin is the great problem of evolution.

4. Another class of adaptations are not racial or inherited but are acquired by animals and plants in the course of their individual lives. They consist in beneficial responses to stimuli and are therefore problems of acquired habits or behavior. Among these, one may note the following beneficial responses to particular stimuli: Increased light of short wave length leads to increased pigmentation of the skin, which protects the underlying tissues from injury. Increased use of a muscle leads to its increased size and strength. Increased cold leads to increased thickness of hair in mammals, to increased activity and feeding on the part of hibernating bears. Bees exposed to cold weather gather into a dormant cluster in the middle of the hive, where they keep one another warm. If those at the surface get too cold they become active and burrow into the middle of the cluster; if the temperature throughout the cluster falls to about 57° F. they all become active, raise their temperature by muscular work, take in food, and when their temperature has risen to about 90° F. they again become inactive or dormant.

Gradual increase of heat or cold leads to an acclimatization to temperatures that would be fatal at once if they came suddenly. A similar tolerance to poisons may be acquired, if only the poisons are administered in gradually increased doses. Bacterial poisons, such as diphtheria toxin, are neutralized by the formation of antitoxins, if only the body has time to form these in sufficient quantity, and thereafter the individual has an acquired immunity to that particular toxin. Finally, in this class of acquired adaptations may be mentioned the great number of adaptations to injuries, ranging all the way from wound-healing to the regeneration of lost limbs as in lobsters and salamanders.

Nothing in the whole world is more wonderful than this ability of organisms to overcome adverse conditions, to neutralize violent poisons, to restore lost parts. Many of these conditions could never have been met before by their ancestors, and therefore these animals could not have inherited this specific fitness. Thus guinea pigs, whose ancestors came from South America, never had opportunity to become adapted to the poison of cobras from India and yet, if the cobra venom is administered in graduated doses, the guinea pigs acquire a tolerance to the venom. Injuries such as could never have happened except under expert surgical operations may be followed by regeneration; thus, if the lens of the eye of a newt is removed it is often completely regenerated. Newts may have lost whole eyes or heads in the past, but certainly never before have they had the lens of the eye removed.

Causes of Adaptation

How have such adaptations arisen, whether racial or individual, inherited or acquired? This is the greatest problem of life and evolution. Innumerable attempts have been made to solve this problem by philosophers and scientists. These attempted solutions may be classified as supernatural, vitalistic, or mechanistic.

1. Supernatural causes presuppose an Intelligence and Will outside of Nature, a *deus ex machina*. This is the old "Argument from Design" for the existence of God. It reached its climax in the "Natural Theology" of William Paley (1802) and in the eight Bridgewater Treatises on "The Power, Wisdom and Goodness of God as manifested in the Creation," which were published under the auspices of the Royal Society from 1836 to 1840. It broke down because of the fact of conflicting designs, as in the case of the fitness of the host to repel the designed attack of the parasite, or the conflicting designs in the opposing

fitnesses of the prey and the predator. It also seemed inconsistent with divine design that there are so many imperfect, rudimentary or incomplete fitnesses; a perfect intelligence should have produced more perfect results. But the compelling evidence against supernatural design came from the growing evidence in favor of natural evolution and from increasing confidence that natural phenomena have natural causes. While the Bridgewater Treatises were being prepared and published, Charles Darwin was on his famous "Voyage of the Beagle," collecting the material and developing the ideas that 23 years later appeared in "The Origin of Species by Means of Natural Selection." What Huxley called "the frivolities of supernatural teleology" are part and parcel of the frivolities of special creation. Few, if any, scientists now admit the special creation of species or the special creation of adaptations.

2. Vitalistic hypotheses assume some sort of intelligence, or will, or psychic principle in organisms themselves that act as guiding or directing causes of adaptation—a sort of *deus in machina*. Among these hypotheses are the "perfecting principle" of Aristotle and Nägeli, the "indwelling soul" of Plato and Bruno, the "active teleological principle" of Kant, the "will" of Schopenhauer, "desire, need, and appetency" of Erasmus Darwin and Lamarck, "unconscious purpose" of Hartmann, "vital force" of Bunge, Wolff and Virchow, "élan vital" of Bergson, "entelechy" of Driesch, "psychism" of Pauly, Boveri and Spemann. The chief objection to these hypotheses is that they are mere names, ghosts without substance, not open to experiment or analysis. Therefore, they tend to prevent further inquiry and are a hindrance to research, unless they are recognized as signposts pointing to the unexplored.

3. Mechanistic explanations of fitness are based largely on Charles Darwin's principle of Natural Selection or the elimination of the unfit and the survival of the fit. If all organisms vary in relative fitness, and if those that are less fit are eliminated, while the more fit survive, there will be a continual drive toward fitness. There is no doubt that this is true and that this elimination of the unfit is much more extensive in germ cells and embryos, which we usually do not see, than in adults. This simple principle of natural selection does explain, as nothing else does, inherited adaptations of all kinds, though of course it does not explain the origin of the useful mutations that are selected.

But classical Darwinism does not explain individually acquired adaptations where useful responses are made by animals and plants to

conditions and crises which they or their ancestors never experienced before. In such cases there is no elimination of unfit individuals; the same animal or plant continues to survive and gradually acquires the ability to make the useful response. In many cases, we know that this is done by a process of trial and error and, finally, trial and success. This is an extension of the principle of the elimination of the unfit from persons to reactions, and at first sight it seems to be a purely mechanistic explanation of acquired fitness. But it is not purely mechanistic, for it is based upon the ability of living things to distinguish between the satisfactory and the unsatisfactory, and to follow after the one and to avoid the other. This capacity must be regarded as a fundamental property of living things, which cannot at present be reduced to simpler terms. Thus, we endow life at the start with the very properties which we seek to explain: namely, the capacity to distinguish and select, which is the beginning of wisdom in all living things.

4. Between vitalism and mechanism there is a middle ground which may be called "Organizationism" or "Emergence," which holds that life, differential sensitivity and reactivity, fitness and psychic phenomena, are results of increasing organization, these new properties "emerging," as it were, by a process of creative synthesis. This organizational theory was introduced by William E. Ritter in 1919, and later by C. Lloyd Morgan in 1923 under the name of "emergence." It has been approved by many leading scientists, including W. M. Wheeler, H. S. Jennings, W. E. Agar, Lovall Evans, A. V. Hill, J. S. Huxley, E. S. Russell and D. M. S. Watson. But emergence of new qualities, while a fact, does not offer a purely mechanistic explanation of life, evolution and fitness, for underlying all of these there seems to be required some directive or teleological principle. While this teleology may seem to many to go back to old philosophical speculations that border on mysticism, the names of such experimental biologists as have been mentioned, and of such outstanding physicists and chemists as Einstein, Planck, Niels Bohr, Otto Loewi and Lawrence J. Henderson, should warn us that there may be good grounds for holding that mechanism and teleology are complementary views of nature, neither excluding the other. For myself, I may say that I have no sympathy with hypotheses of "vital forces" or "vital principles" that are wholly unrelated to other forces and principles of nature; but with the idea that organisms are endowed with differential sensitivity and useful tropisms and that there is some genetic relationship between the fitness of behavior

and that of evolution, between individually acquired adaptations and inherited or racial ones, I have a great deal of sympathy.

Postponing, for the time, the further consideration of the origin or evolution of inherited fitness, let us look at the adaptive behavior of animals, from the highest to the lowest, rather than in the reverse order. It is the practice of embryologists to look at development from both ends of the process: that is, to study the development of the egg through its various stages until it gives rise to developed organs, and to work backward from organs to their earliest beginnings in the embryo and egg. Only in this way is it possible to trace the origin of many developed characteristics, the beginnings of which would be overlooked in greatly simplified early stages. Of course, the evolutionist follows this same practice, for the beginnings of fully evolved structures and functions and adaptations would be overlooked unless they were traced backward from the later to the earlier stages in evolution.

We are generally cautioned to be on guard against the dangers of anthropomorphism: that is, of considering animals from the standpoint of man, and yet, at the same time, we are assured that man is only a later stage of development of the animal series. It should be possible to find the early beginnings of human behavior and acquired adaptations in the behavior of animals below men. How do human beings acquire habits of useful behavior? By a process of trying all things and holding fast to that which is good, as St. Paul expressed it. This process has long been called a method of "trial and error" and, finally, trial and success. I do not know who first used the phrase "trial and error," but I find it referred to, as if in common use, by Huxley in his discussion of teleology in his article, "Criticisms of the Origin of Species," which is dated 1864 (Collected Essays, Vol. II, p. 84). Later studies of animal behavior have shown that cats learn to let themselves out of cages and that horses learn to open gates or doors and that higher animals in general learn to do useful things by this process of trial and error. In 1904, and again in 1906, Jennings found that lower organisms, especially *Paramecium* and *Amoeba,* reach adaptive or useful ends by this same process of trial and error. For example, *Paramecia* in a trough of water, which is hot at one end and cold at the other, swim on random courses until they come into water which is hot or cold, when they back, turn into a new course and go ahead until they again run into hot or cold water, when the avoiding action is repeated, with the final result that they are found in water of medium temperature. This

useful or adaptive result has been attained by a multitude of random movements, elimination of those that are injurious or unsatisfactory and persistence in those that are beneficial or satisfactory. *Paramecium* differentiates or distinguishes between the satisfactory and the unsatisfactory, or what E. C. Tolman (1941) has recently called "satiations" and "sufferances," and this introduces a psychic factor, which strict mechanists, such as Jacques Loeb, repudiate; and yet, as evolutionists, we should be ready to trace the adaptive and psychic processes of higher animals to their beginnings in lower forms. To attribute such adaptive results to tropisms merely puts back into tropisms this problem of adaptation. Of course, I am not forgetting that development and evolution are in the main epigenetic processes by which the more complicated end stages are built upon the less complicated earlier ones, but I also refuse to forget that these earlier stages are also complex, that the egg or the *Paramecium* are complex organisms and that development is endogenetic as well as epigenetic. Both epigenesis and endogenesis are involved in all development and evolution.

Apparently the adaptive responses of plants as well as animals grow out of differential sensitivity to beneficial or injurious stimuli with positive reactions to the former and negative ones to the latter. The botanist Macfarlane (1918) maintained that "Plants have the capacity of growing or moving toward the environment most satisfying." One sees this in the positive phototropism of shoots and the negative phototropism of roots: e.g., in the growth of shoots of potatoes for long distances toward cellar windows, or in the growth of roots of trees for many feet toward water drains. Such beneficial behavior comes from growth in various directions, elimination of the non-beneficial and persistence in the beneficial responses. The plant differentiates and selects between the two.

The *elements* of our own behavior are found in all organisms. Living things generally act as if some stimuli or environments are satisfactory and are responded to positively, while others are unsatisfactory and are responded to negatively. Protoplasm does not respond as a stone or an inert substance. In the words of Zur Strassen (1915), it is full of "organized seekings," and by processes of trial and error these lead to useful or fit results. You may call this anthropomorphism when applied to *Amoeba* or amoeba-morphism when applied to man, but it is something psychic out of which mind and purpose develop. When Loeb had reduced animal behavior to tropism and forced move-

ments he had not eliminated differential sensitivity and reactivity, which are the elements out of which satisfaction and dissatisfaction, discrimination and selection, intelligence and purpose develop.

Acquired adaptations or useful behavior develop by a process of trial and error, which involves the capacity to distinguish and select between the satisfactory and the unsatisfactory. Is it possible that a similar process is involved in inherited adaptations or the evolution of the general fitness of organisms in nature? Charles Darwin's process of natural selection seems to be a parallel process. Here we have an overproduction of mutations, good, bad and indifferent, while the environment weeds out the bad and leaves only the good or indifferent: that is, there is survival of the fit, not necessarily the fittest. But in classical Darwinism it seems that the environment eliminates or selects, while the organism is passive in this process, whereas in adaptive behavior it is the organism that selects or rejects. Perhaps further analysis would show that this difference is not so fundamental as at first appears, for even in natural selection it is the failure of the organism to meet conditions of the environment that leads to its elimination. Another distinction between the natural selection of the fit and the trial and error process in behavior is that, in the former, unfit individuals or groups of individuals are eliminated, whereas, in the latter, only unfit responses or reactions are eliminated, while the individual persists. But with these exceptions there is a fundamental resemblance between natural selection and trial and error.

Lamarckism seems to solve very beautifully the problem of the evolution of adaptations by assuming that adaptive behavior becomes hereditary, but unfortunately there is no satisfactory evidence in favor of the inheritance of acquired adaptations, no evidence that the experience of an animal or plant in meeting and overcoming adverse conditions can be pushed back into the egg or sperm, or their chromosomes and genes, so as to reappear in the next generation as an inherited adaptation. It is too bad that Lamarckism is not true, for it would afford a ready explanation of inherited adaptations.

We seem compelled then to fall back upon Darwinism, together with all the aids furnished by Mendelism, mutation, genes and statistical studies of the survival rates of certain genotypes, in order to account for the origin of inherited adaptations. And yet, to me, this seems an incomplete and even an improbable solution of this great problem. When one considers, for example, all the adaptations and co-

adaptations that are found in the eyes of vertebrates—the remarkable fitness of the retina with its rods and cones for receiving and transmitting the stimuli of light of varying intensities and wave lengths; the beautiful dioptric apparatus of transparent cornea, lens and humors; the elastic lens with the ciliary muscles for focusing the light coming from near or far objects; the iris with its intrinsic muscles for controlling the amount of light admitted; the intrinsic nerve supply and blood vessels; the accessory parts for the protection of this delicate apparatus, the eyeball with its tough outer coat, the eye socket and bony orbit, eyelids, eyelashes, eyebrows, lachrymal glands and ducts, etc.,—when one considers such an assembly of remarkable adaptations and coadaptations, he cannot fail to ask whether all these have been produced by purely fortuitous mutations, followed by the elimination of those individuals that were not well adapted. Do we not load upon chance mutation an impossible burden in requiring it to provide all the functions and structures of such remarkable fitness? Surely there must be other factors than those now generally recognized in the origin of such wonderful adaptations. It is no wonder that Darwin said that he never thought of attempting to explain the origin of the eye without a shudder.

I have no theory to propose to explain the origin of organic fitness and human purpose other than the endowment of living beings with differential sensitivity and reactivity, tropisms, organic memory, trial and error behavior, leading in higher animals to intelligence and purpose. I do not doubt the reality of the mechanistic principles of physics and chemistry and natural selection in the evolution of organisms with all their adaptations. But with crude mechanism that finds everything the result of accident and chance I have no more sympathy than with transcendental vitalism. Those who say there are no ends, values, purposes in the living world may understand atoms, molecules and even genes, but they do not understand organisms. They see the elements of which life is composed, but they fail to see the pattern and beauty of the entire tapestry of life.

SECTION OF ANTHROPOLOGY

JANUARY 24, 1944

MR. GREGORY BATESON, Associate in International Administration, Columbia University, New York, N. Y.: *Pidgin English and Cross-Cultural Communication.*

One of the most pressing problems, in a world which is becoming increasingly close-knit, is that of mutual understanding between peoples with basically different cultures, different value systems and different emotional attitudes to life. In this field, language is one of our most essential tools and whenever we have a problem in cross cultural communicatcn between peoples of different language our thoughts turn naturally to the possibility of using some easy *lingua franca*—Basic English, Esperanto or Pidgin.

In this paper, I want to discuss the Pidgin English of the Mandated Territory of New Guinea, a *lingua franca* which was not consciously constructed like Basic English or Esperanto but which developed naturally as a medium of communication between whites and natives in the New Guinea environment.

Historically, this particular Pidgin differs from most of the trade languages of the world in that it has become stabilized. Usually, these simplified languages are steadily enriched, either from the white side or from the native, because one side at least feels the trade language to be a corruption of its own and therefore tries to "correct" it. A little progress of this sort probably occurred in New Guinea, because housewives in Rabaul spoke very poor Pidgin and therefore introduced English words in talking to their cook-boys, and still more progress of the same sort may result from contact between Anglo-American troops and New Guinea natives. In general, however, when I met with it, Pidgin was a stable language and had been stabilized by the Germans. Pidgin English grew up in New Guinea before the area became a German colony in the 1880's, and the Germans, therefore, arrived to find that they must learn a language which was not theirs. They were not tempted, as the English are, to make the language more like their own, but simply learned it as a foreign language. They learned it and thereby contributed nothing to it, except stability. The whole vocabulary

of Pidgin—about a thousand words—contains less than a dozen words which can clearly be recognized as of German origin.

Another factor which has contributed to the stabilization of this Pidgin is the multiplicity of the native languages in the New Guinea area. Every five or ten miles along the road the traveler meets a new language, and there are something like a thousand languages in New Guinea. When a native leaves his village and goes to work as an indentured laborer in the white man's plantations or gold mines, he finds, on the labor line, a mixture of other natives from as many as twenty linguistic areas, and Pidgin therefore becomes naturally the *lingua franca* for communication between natives of different linguistic origin.

Pidgin may be described as a hybrid between English and the Melanesian family of languages which predominate in the coastal areas of New Guinea which were first colonized (the Gazelle Peninsula, New Ireland, Admiralty Islands, etc.). But this hybridization has not been on random lines. The language is not a mere mixture of English and Melanesian characteristics. Rather, it is a systematic fitting of English vocabulary to Melanesian grammar and syntax. Between seventy and eighty per cent of the vocabulary is of English origin, the remainder being made up of words from mixed European and native sources. In a few cases, a single word may combine both English and native roots. The word *liklik*, meaning "small," for example, is such a hybrid between the English *little* and *ikilik*, the word for "small" in the language of Rabaul. The moment, however, we leave the details of vocabulary and consider the system of grammatical structure, we find pure Melanesian forms, even down to such details as duals, inclusive and exclusive pronouns, etc.

The question which we have to consider is whether such a hybrid language does, in fact, serve to communicate the culturally patterned thoughts of the white man to the native. Inversely, does it serve to convey the culturally patterned thoughts of the native to the white man? Are the two peoples brought into closer communion by Pidgin English?

This question clearly transcends all the details of grammar and vocabulary, which are the ordinary stuff for linguistic study. It asks, in fact, whether the ideas and emotions which normally occur in Pidgin conversation are in any sense a mixture of the white man's ideas and emotions with the ideas and emotions charactistic of native life. And the answer appears to be a flat negative.

I do not want to give the impression that Pidgin English is a poor

language. Its vocabulary is big enough, its tones of voice and emphasis are rich and varied, and when one speaks Pidgin one has no feeling of frustration. My own feeling—and that of most white men—is of handling a rich and flexible language, and the turns of phrase which must be coined in order to convey some word not in the vocabulary, increasing rather than decreasing the feeling of liveliness in the language.

The truth is that Pidgin, in spite of its hybrid origin, constitutes something new. The language and its tones of voice and the things that are said in it are a rudimentary third culture, neither native nor white, and within the conventions of this third culture the white man and the native can meet happily, though the culture is germane to neither of them. Each may have in the back of his mind a whole mass of thoughts and values and interpretations of the world which are specifically his. The white man has his notions of competition, sacrifice, fair play, justice, checks and balances, democracy, discipline and so on, and the native correspondingly may have in the back of his mind his own interpretations of life, his feelings for symmetry in human relations, his notions of the sacred and the unclean, of gift exchanges, and the validation of social events. But neither the white man's philosophy of life, nor that of the native, crops up in the neutral and special fields of Pidgin English conversation. It is not that democracy and private enterprise could not be described in Pidgin, it is just that, in fact, they are not. The language is quite rich enough to convey anything that the speaker clearly understands, but it is not close enough to English to convey something which the speaker has not himself analyzed. There is no single counter in Pidgin which could be substituted for any one of the highly valued counters and symbols of our political, religious and social life. The white man, when he enters the world of Pidgin English, unless he is willing to dissect his own values down to their simplest terms, must therefore leave these values behind, so far as conversation is concerned, and must deal in the specific values—equally vague but differently organized—of the Pidgin world. Similarly, the native must leave behind his own special values and ideas and embark on a new world.

The emotional content of the Pidgin English culture is difficult to define—it is always difficult to define the ethos of a system of human behavior. The normal techniques for such an analysis are based on the process of acculturation of children. When we study a native tribe we collect the system of stylized behavior and relate this back to the way

in which children are brought up to be members of their tribe. Out of the counterpoint between adult behavior and parent-child relations, we build up a coherent picture of the emotions and ideas which are systematically bound up together—partly explicit and partly implicit—in the culture. For Pidgin English, this has never been done. There is nothing equivalent to the parent-child relationship, and the induction of the native boy and the newly arrived white man into the Pidgin English culture follows no standardized lines. A genetic study is scarcely possible.

The ethos of Pidgin English is, however, shaped by certain negative features. It is, like the rudimentary culture which develops between passengers on a ship, a rather gay, rather irresponsible and meaningless world. Both white man and native have put aside many of the fundamentals of life. The indentured native has left his kin behind in the village and is embarked on an adventure which he knows will one day end. When he goes home, three or four years later, he will be proud that he, too, has "worked"; but, for the time being, he is suspended in an interim period of life whose length is fixed by his contract of service, as is the length of a voyage or a prison sentence. The world on which he enters is almost exclusively male; it is happy, cooperative and simple. Like a soldier entering the army, he must learn to obey a daily routine; his food and sleep are automatically included in this routine; and the complexities and responsibilities of his normal background are in abeyance. Between the white man and the native there is continual emotional give and take resembling in some ways the sort of emotional bond which—whether it was stable or not and whether it was desirable or not—was at any rate a clearly patterned relationship between white men and Negroes in the American South.

The Pidgin world is characterized, too, by overtly recognized caste structure. The line between white and native is recognized by both sides and is regarded by both sides as based on superiority and inferiority. Most of the native cultures of New Guinea are almost without heirarchical structure; chieftanship is comparatively rare; and there is little to correspond to the elaborate status systems of Indonesia and Polynesia. The native, therefore, when he enters the Pidgin world, must take on patterns which are foreign to him,—he must act out the role of inferiority vis-à-vis the white man, and if he becomes a boss-boy or a member of the native constabulary he must act out the role of superiority vis-à-vis the other natives. He learns to do this without

much difficulty, but the presence of this hierarchical theme in the Pidgin culture means that the whole system of Pidgin life is foreign to him. It is a culture put on in late adolescence, not one for which he was prepared in early infancy.

In sum, it appears that Pidgin is not a means whereby the white man communicates white thoughts, nor is it a means by which the native communicates native thoughts. It is another world in which white man and native meet. In this other world they feel that they communicate fully and richly, but the matter of their communication is not closely related to the system of life in which either of them grew up.

This diagnosis, which recognizes Pidgin English as, on the whole, a barrier between white man and native, raises a number of problems of long-time policy in regard to the future development of any area within which a *lingua franca* has become stabilized. In New Guinea, the multiplicity of native languages precludes any possibility that any one of these might become a *lingua franca*, and the stability and richness of Pidgin will make it exceedingly difficult to introduce English. Human beings are lazy and are unlikely to learn a difficult language when an easy one is at hand for casual communication. It is, however, possible that Pidgin English might be enriched, both from the native side and from the white, and some enrichment from the white side is no doubt occurring at the present moment. The thousands of English speaking troops in New Guinea can be trusted to speak Pidgin badly and so to enrich the concepts as well as the slang of the language.

On the native side it is more difficult to see how the enrichment will come. The language, however, already contains a certain number of terms for dealing with purely native concepts. There is, for example, the word *kandare*, for a classificatory mother's brother, *tumbuan* for a masked figure, *marsalai* for the New Guinea equivalent of the Rainbow Serpent, *poroman* for a matched companion, and a few others. Terms of this sort are already a help to the anthropologist and administrator who must discuss native life in Pidgin. For any given tribe, it is easy to add new words and special concepts from the local language to the Pidgin vocabulary, and this, perhaps, is a valuable contribution which the anthropologist makes. More could be done by a serious study of the features common to large numbers of New Guinea tribal systems, so that these common features at least could be labelled in Pidgin and so brought to the attention of the white man.

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CONDITIONS:

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(2) Date. Papers are to be submitted on or prior to **October 1, 1944,** to the Executive Secretary of The New York Academy of Sciences, at The American Museum of Natural History, Central Park West at 79th Street, New York, N. Y.

(3) Papers. All papers submitted must embody the results of original research not previously published. The manuscript shall be typewritten, in English, accompanied by all necessary photographs, drawings, diagrams and tables, and shall be ready for publication. Papers must be accompanied by a summary of the data presented and conclusions reached.

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